

PLOTTING CHARACTERS IN TWO AND THREE DIMENSIONS

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Internal Report # 13
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January, 1970

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Routines have been implemented on the IBM System 360/75 which allow the plotting on the Cal Comp plotter of all of the following characters:

- (1) Upper and lower case latin letters
- (2) Upper and lower case greek letters
- (3) Digits
- (4) 53 different special characters
- (5) 15 standard plotting symbols

These characters are all designed to be plotted with "PRØPLT" (see Internal Report No. 12), thus allowing the meaningful labelling of three dimensional figures. The characters can also be used in labelling two dimensional figures in either of two ways: (a) with the present form of the programs, of course, by always setting the "third" coordinate equal to zero, or (b), to save the added time involved in computing projections, separate versions specifically designed for two dimensions can be generated.

Figure 1 summarizes all of the characters available.

LATIN LETTERS

CALL PPLETR(XLLHC,YLLHC,ZLLHC,JLETR,THETA,SIZE)

This routine generates one letter according to the values of the parameters

XLLHC,YLLHC,ZLLHC - the three dimensional cartesian coordinates of the lower left hand corner of a rectangle superscribing the letter to be written.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r s t u v w x y z

Α Β Γ Δ Ε Ζ Η Θ Ι Κ Λ Μ Ν Ξ Ο Π Ρ Σ Τ Τ Φ Χ Ψ Ω

Ω α β γ δ ε ζ η θ ϑ ϰ κ λ μ ν ξ ο π ρ σ τ υ φ χ ψ ω

1 2 3 4 5 6 7 8 9

& - / . , " ? ! : \$ # ← * % @ () ^ ' + ; _ = ≠ ∅

± √ > < ≠ ∂ ∇ ÷ ∫ [] {} ≥ ≤ ∞ ~ ≡ ≈ ≅ √ ° Å ∞ →

□ ○ △ + × ◊ ♣ × Z Y ✕ * ∞ I ✱

Figure 1. Examples of Characters Available with "PPLETR", "PPGREK", "PPDIGT", "PPCHAR" and "PPSYMB"

JLETR - a code number indicating which letter is to be plotted according to the following table:

	upper case	lower case
A	1	27
B	2	28
C	3	29
D	4	30
E	5	31
F	6	32
G	7	33
H	8	34
I	9	35
J	10	36
K	11	37
L	12	38
M	13	39
N	14	40
Ø	15	41
P	16	42
Q	17	43
R	18	44
S	19	45
T	20	46
U	21	47
V	22	48
W	23	49
X	24	50
Y	25	51
Z	26	52

THETA - the angle at which the letter is to be plotted, measured in radians in the plane of the letter relative to the horizontal axis (see discussion of CØMMØN block "/PLANE/" below).

SIZE - the height in inches of the letter. The width of the letter will be $0.6 * \text{SIZE}$, while the space occupied by a string of N letters will be $(0.8 * (N-1) + 0.6) * \text{SIZE} \approx 0.8 * N * \text{SIZE}$ (see discussion of CØMMØN block "/NEXT/" below).

GREEK LETTERS

CALL PPGREK(XLLHC,YLLHC,ZLLHC,JGREK,THETA,SIZE)

XLLHC,YLLHC,ZLLHC - same as for "PPLETR"

JGREK - a code number indicating which greek letter is to be plotted according to the following table

	upper case	lower case
alpha	1	25
beta	2	26
gamma	3	27
delta	4	28
epsilon	5	29
zeta	6	30
eta	7	31
theta	8	32
(script)		33
iota	9	34
kappa	10	35
lambda	11	36
mu	12	37
nu	13	38
xi	14	39
omicron	15	40
pi	16	41
rho	17	42
sigma	18	43
(script)		44
tau	19	45
upsilon	20	46
phi	21	47
chi	22	48
psi	23	49
omega	24	50

THETA - same as for "PPLETR"

SIZE - same as for "PPLETR"

DIGITS

CALL PPDIGT(XLLHC,YLLHC,ZLLHC,JDIGT,THETA,SIZE)

XLLHC,YLLHC,ZLLHC - same as for "PPLETR"

JDIGT - the digit to be plotted

THETA - same as for "PPLETR"

SIZE - same as for "PPLETR"

SPECIAL CHARACTERS

CALL PPCHAR(XLLHC,YLLHC,ZLLHC,JCHAR,THETA,SIZE)

XLLHC,YLLHC,ZLLHC - same as for "PPLETR"

JCHAR - a code number indicating which special character is to be plotted according to the following table:

symbol	code number
(blank)	1
&	2
-	3
/	4
.	5
,	6
"	7
?	8
!	9
:	10
\$	11
#	12
→	13
*	14
%	15

symbol	code number
@	16
(17
)	18
flag	19
'	20
+	21
;	22
-	23
=	24
≠	25
¢	26
±	27
√	28
>	29
<	30
≠	31
∂	32
∇	33
÷	34
∫	35
[36
]	37
{	38
}	39
≥	40
≤	41
∞	42

symbol	code number
~	43
≡	44
≈	45
∥	46
✓	47
degree	48
∅	49
umlot	50
arrow pointing left to right at (XLLHC,YLLHC, ZLLHC)	51
underline (previous symbol)	52
overline (previous symbol)	53

THETA - same as for "PPLETR"





SIZE - same as for "PPLETR"

PLOTTING SYMBOLS

CALL PSYMB(XDATA,YDATA,ZDATA,JSYMB,SIZE)

XDATA,YDATA,ZDATA - three dimensional cartesian
coordinates of data point at
which plotting symbol is to be
drawn

JSYMB - a code number indicating the plotting symbol
to be drawn according to the following table

symbol	code
	1
	2
	3
	4

symbol	code
X	5
◇	6
⊕	7
⊗	8
Z	9
Y	10
⊘	11
*	12
⊗	13
	14
☆	15

SIZE - same as for "PPLETR"

COMMON BLOCKS

All of the above routines share the following COMMON blocks (exception: "PPSYMB" does not use "/NEXT/" or "/LAST/")

/NEXT/XNLLHC,YNLLHC,ZNLLHC

XNLLHC,YNLLHC,ZNLLHC - three dimensional cartesian coordinates of the lower left hand corner of the next character to be plotted. The pen is left in the position of the projection of this point

/PLANE/JPLANE

JPLANE - a code indicating one of the three coordinate planes

- = 1 X,Y-plane
- = 2 X,Z-plane
- = 3 Y,Z-plane

The character or symbol is plotted so that its plane is parallel to the plane indicated by "JPLANE".

/LAST/THLAST,CTH,STH

THLAST - the value of "THETA" at the last call to one of "PPLETR", "PPGREK", "PPCHAR" and "PPDIGT". (Used internally, and of no consequence to the user).

CTH,STH - cosine and sine of "THLAST".

SYMBOL STRINGS

Since most of the characters and symbols implemented above do not correspond directly to either a card punch or EBCDIC code, there is no simple method for developing a program analogous to "SYSSYM" which will handle an arbitrary string of symbols. At present there must be a one-to-one correspondence between symbols and calls to one of the above routines. One method of handling a variable title is to set up an array of pseudo-code numbers constructed from standard code numbers in some manner such as adding 100 for greek letters, 200 for digits, and 300 for special characters. Thus the following code

```
DIMENSION SYMBOL(32)
INTEGER SYMBOL
DATA NSYMB/18/,SYMBOL/38,41,33,317,22,201,22,202,
+ 22,353,203,353,301,44,27,46,31,318,14*0/
COMMON/NEXT/XNLLHC,YNLLHC,ZNLLHC
.
.
.
DO 10 I = 1, NSYMB
  ISYMB = SYMBOL(I)
  IHUND = ISYMB/100
  ISYMB = ISYMB - IHUND*100
  IHUND = IHUND+1
  GO TO (1,2,3,4,10),IHUND
1 CALL PPLETR(XNLLHC,YNLLHC,ZNLLHC,ISYMB,THETA,SIZE)
  GO TO 10
2 CALL PPGREK(XNLLHC,YNLLHC,ZNLLHC,ISYMB,THETA,SIZE)
  GO TO 10
3 CALL PPDIGT(XNLLHC,YNLLHC,ZNLLHC,ISYMB,THETA,SIZE)
  GO TO 10
4 CALL PPCHAR(XNLLHC,YNLLHC,ZNLLHC,ISYMB,THETA,SIZE)
10 CONTINUE
.
.
.
```

will result in the following string of symbols being plotted:

$\log(V1V2V3 \text{ rate})$

at the appropriate projection, position, and orientation, provided that these have been properly established elsewhere.

Replacing the "DATA" statement above with

DATA NSYMB/32/,SYMBOL/9,40,48,27,44,35,27,40,46,
+ 301,12,27,46,35,46,47,30,31,301,303,301,111,301,
+ 317,30,31,33,44,31,31,45,318/

would result in the following string of symbols being plotted

Invariant Latitude - Λ (degrees)

subject to the same conditions.

STORAGE AND TIMING

	program length (bytes)	average time/ character (ms)
PPLETR	8840 (2288) ₁₆	3.45
PPGREK	10474 (28EA) ₁₆	3.61
PPDIGT	3168 (C60) ₁₆	2.31
PPCHAR	9370 (249A) ₁₆	2.64
PPSYMB	2700 (A8C) ₁₆	1.45

LE/jam

Distribution:

E. Aguilar
J. Brown
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J. Lupton
S. Murray
J. Stevenson
E. Stone

APPENDIX

LISTINGS FOR "PPLETR", "PPGREK", "PPDIGT", "PPCHAR" AND "PPSYMB"

```

SUBROUTINE PPLETR(/XLLHC/,/YLLHC/,/ZLLHC/,JLETR,THETA,SIZE)      PLETR001
                                                                    PLETR002
PPLETR GENERATES A PERSPECTIVE PLOT OF A CAPITAL OR LOWER CASE  PLETR003
LETTER                                                            PLETR004
                                                                    PLETR005
INPUT PARAMETERS                                                 PLETR006
  XLLHC,YLLHC - THE X,Y-COORDINATES (IN INCHES) OF THE        PLETR007
                LOWER LEFT-HAND CORNER OF THE LETTER           PLETR008
  JLETR - CODE NUMBER INDICATING THE LETTER TO BE PLOTTED     PLETR009
                LETTER          CODE FOR          CODE FOR
                CAPITALS      LOWER CASE
                                                                    PLETR010
                A              1              27                PLETR011
                B              2              28                PLETR012
                C              3              29                PLETR013
                D              4              30                PLETR014
                E              5              31                PLETR015
                F              6              32                PLETR016
                G              7              33                PLETR017
                H              8              34                PLETR018
                I              9              35                PLETR019
                J             10             36                PLETR020
                K             11             37                PLETR021
                L             12             38                PLETR022
                M             13             39                PLETR023
                N             14             40                PLETR024
                O             15             41                PLETR025
                P             16             42                PLETR026
                Q             17             43                PLETR027
                R             18             44                PLETR028
                S             19             45                PLETR029
                T             20             46                PLETR030
                U             21             47                PLETR031
                V             22             48                PLETR032
                W             23             49                PLETR033
                X             24             50                PLETR034
                Y             25             51                PLETR035
                Z             26             52                PLETR036
                                                                    PLETR037
  THETA - THE ANGLE (IN RADIAN'S, IN THE X,Y-PLANE) AT        PLETR038
                WHICH THE LETTER IS TO BE PLOTTED            PLETR039
  SIZE - THE HEIGHT (IN INCHES) OF THE LETTER                 PLETR040
                                                                    PLETR041
SEE OTHER ENTRY POINTS                                         PLETR042
                                                                    PLETR043
COMMON BLOCKS                                                  PLETR044
  /NEXT/XNLLHC,YNLLHC,ZNLLHC                                    PLETR045
                XNLLHC - X-COORDINATE (IN INCHES) IN X,Y-PLANE OF
                LOWER LEFT HAND CORNER OF NEXT SYMBOL          PLETR046
                YNLLHC - CORRESPONDING Y-COORDINATE           PLETR047
                ZNLLHC - CORRESPONDING Z-COORDINATE           PLETR048
  /PLANE/JPLANE                                                PLETR049
                JPLANE - INDICATES COORDINATE PLANE PARALLEL TO
                WHICH LETTER IS TO BE WRITTEN.                PLETR050
                = 1  X,Y-PLANE                                  PLETR051
                = 2  X,Z-PLANE                                  PLETR052
                = 3  Y,Z-PLANE                                  PLETR053
                                                                    PLETR054
  /LAST/THLAST,CTH,STH                                         PLETR055
                THLAST - LAST VALUE OF THETA                   PLETR056
                CTH,STH - COSINE AND SINE OF 'THLAST'          PLETR057
                                                                    PLETR058
                                                                    PLETR059
SUBROUTINE PPLETR(/XLLHC/,/YLLHC/,/ZLLHC/,JLETR,THETA,SIZE)  PLETR060
COMMON/PLANE/JPLANE

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COMMON/NEXT/XNLLHC,YNLLHC,ZNLLHC
COMMON/LAST/THLAST,CTH,STH
DIMENSION NX(53),RX(358),RY(358),IPEN(358),IRX(358),IRY(358),
+ LXAE(48),LYAE(48),LIPAE(48),LXFJ(44),LYFJ(44),LIPFJ(44),
+ LXKO(33),LYKO(33),LIPKO(33),LXPT(41),LYPT(41),LIPPT(41),
+ LXUZ(28),LYUZ(28),LIPUZ(28),UXAE(38),UYAE(38),UIPAE(38),
+ UXFJ(31),UYFJ(31),UIPFJ(31),UXKO(26),UYKO(26),UIPKO(26),
+ UXPT(40),UYPT(40),UIPPT(40),UXUZ(28),UYUZ(28),UIPUZ(28)
INTEGER UXAE,UYAE,UIPAE,UXFJ,UYFJ,UIPFJ,UXKO,UYKO,UIPKO,UXPT,
+ UYPT,UIPPT,UXUZ,UYUZ,UIPUZ
EQUIVALENCE (IRX(1),UXAE(1)), (IRY(1),UYAE(1)),
+ (IPEN(1),UIPAE(1)),(IRX(39),UXFJ(1)),(IRY(39),UYFJ(1)),
+ (IPEN(39),UIPFJ(1)),(IRX(70),UXKO(1)),(IRY(70),UYKO(1)),
+ (IPEN(70),UIPKO(1)),(IRX(96),UXPT(1)),(IRY(96),UYPT(1)),
+ (IPEN(96),UIPPT(1)),(IRX(136),UXUZ(1)),(IRY(136),UYUZ(1)),
+ (IPEN(136),UIPUZ(1)),(IRX(164),LXAE(1)),(IRY(164),LYAE(1)),
+ (IPEN(164),LIPAE(1)),(IRX(212),LXFJ(1)),(IRY(212),LYFJ(1)),
+ (IPEN(212),LIPFJ(1)),(IRX(256),LXKO(1)),(IRY(256),LYKO(1)),
+ (IPEN(256),LIPKO(1)),(IRX(289),LXPT(1)),(IRY(289),LYPT(1)),
+ (IPEN(289),LIPPT(1)),(IRX(330),LXUZ(1)),(IRY(330),LYUZ(1)),
+ (IPEN(330),LIPUZ(1))
DATA NX/1,8,19,27,33,39,43,54,59,64,70,75,78,82,85,96,102,112,
+ 120,132,136,142,145,150,153,158,164,174,184,192,202,212,220,
+ 232,238,245,256,261,263,274,280,289,299,309,314,326,330,337,
+ 340,345,348,352,358/
DATA UXAE/0,3,9,12,12,0,12,0,8,10,10,8,0,9,12,12,9,0,12,9,3,0,0,
+ 3,9,12,0,9,12,12,9,0,10,0,0,12,0,8/
DATA UYAE/17,20,20,17,0,8,8,20,20,18,14,12,12,12,9,3,0,0,17,20,
+ 20,17,3,0,0,3,20,20,17,3,0,0,20,20,0,0,12,12/
DATA UIPAE/5*2,3,6*2,3,5*2,3,13*2,3,3*2,3,2/
DATA UXFJ/0,10,0,8,12,9,3,0,0,3,9,12,4,12,12,0,0,12,12,12,12,6,6,
+ 0,12,0,0,3,9,12,12/
DATA UYFJ/20,20,12,12,17,20,20,17,3,0,0,3,10,10,0,20,12,12,20,0,
+ 0,0,20,20,20,6,3,0,0,3,20/
DATA UIPFJ/2,2,3,2,3,7*2,3,3*2,3,2,3,2,2,3,2,3,2,3,5*2/
DATA UXKO/0,0,12,6,12,0,0,12,0,6,12,12,0,12,12,0,3,9,12,12,9,3,
+ 0,0,8,12/
DATA UYKO/20,4,20,12,0,20,0,0,20,8,20,0,20,0,20,3,0,0,3,17,20,20,
+ 17,3,16,20/
DATA UIPKO/2,3,2,3,2,3,9*2,3,8*2,3,2/
DATA UXPT/0,9,12,12,9,0,8,12,3,9,12,12,9,3,0,0,0,9,12,12,9,0,9,12,
+ 0,3,9,12,12,9,3,0,0,3,9,12,6,6,0,12/
DATA UYPT/20,20,17,11,8,8,4,0,0,0,3,17,20,20,17,3,20,20,17,11,8,
+ 8,8,0,3,0,0,3,9,12,12,15,17,20,20,17,0,20,20,20/
DATA UIPPT/6*2,3,2,3,13*2,3,2,3,11*2,3,2,3,2/
DATA UXUZ/0,0,3,9,12,12,0,6,12,0,2,6,10,12,12,0,12,0,6,12,6,6,
+ 12,0,12,0,2,10/
DATA UYUZ/20,3,0,0,3,20,20,0,20,20,0,12,0,20,20,0,20,8,20,8,
+ 0,0,0,20,20,10,10/
DATA UIPUZ/3,5*2,3,2,2,3,5*2,3,2,3,2,2,3,2,3,3*2,3,2/
DATA LXAE/12,9,3,0,0,3,9,12,12,12,0,3,9,12,12,9,3,0,0,0,12,9,3,0,
+ 0,3,9,12,12,9,3,0,0,3,9,12,12,12,0,12,12,9,3,0,0,3,9,12/
DATA LYAE/9,12,12,9,3,0,0,3,12,0,3,0,0,3,9,12,12,9,20,0,9,12,12,
+ 9,3,0,0,3,9,12,12,9,3,0,0,3,20,0,6,6,9,12,12,9,3,0,0,3/
DATA LIPAE/3,7*2,3,2,3,7*2,3,2,3,7*2,3,7*2,3,2,3,9*2/
DATA LXFJ/2,2,5,9,12,12,0,8,0,3,9,12,12,9,3,0,0,3,9,12,0,0,3,9,
+ 12,12,6,6,6,8,6,4,6,0,0,3,7,10,10,10,12,10,8,10/
DATA LYFJ/0,17,20,20,17,15,10,10,-5,-8,-8,-5,9,12,12,9,3,0,0,3,
+ 20,9,12,12,9,0,0,12,14,16,18,16,14,-2,-5,-8,-8,-5,12,14,16,18,
+ 16,16/
DATA LIPFJ/3,5*2,3,2,3,12*2,3,4*2,3,2,3,4*2,3,5*2,3,4*2/

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PLETR062
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PLETR122

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DATA L XKD/0,0,12,6,12,6,6,0,0,2,4,6,6,6,8,10,12,12,0,0,3,9,12,12, PLETR123
+ 0,3,9,12,12,9,3,0,0/ PLETR124
DATA LYKD/20,2,12,6,0,0,20,12,10,12,12,10,0,10,12,12,10,0,12,9, PLETR125
+ 12,12,9,0,3,0,0,3,9,12,12,9,3/ PLETR126
DATA LIPKD/2,3,2,3,2,3,2,2,3,4*2,3,5*2,3,4*2,3,8*2/ PLETR127
DATA LXPT/0,3,9,12,12,9,3,0,0,0,12,9,3,0,0,3,9,12,12,12,0,0,3,9, PLETR128
+ 12,0,2,10,12,12,10,2,0,0,2,10,12,6,6,2,10/ PLETR129
DATA LYPT/3,0,0,3,9,12,12,9,12,-8,3,0,0,3,9,12,12,9,12,-8,12,9, PLETR130
+ 12,12,9,2,0,0,2,4,6,6,8,10,12,12,10,0,16,12,12/ PLETR131
DATA LIPPT/3,7*2,3,2,3,7*2,3,2,2,3,3*2,3,11*2,3,2,3,2/ PLETR132
DATA LXUZ/0,0,3,9,12,12,12,0,6,12,0,3,6,9,12,12,0,12,0,6,12,2,12, PLETR133
+ 0,12,0,3,9/ PLETR134
DATA LYUZ/12,3,0,0,3,12,0,12,0,12,12,0,12,0,12,12,12,0,12,0,12, PLETR135
+ -8,0,0,12,12,6,6/ PLETR136
DATA LIPIUZ/3,4*2,3,2,3,2,2,3,5*2,3,2,3,2,3,2,3,3*2,3,2/ PLETR137
DATA IENT/0/ PLETR138
IF(IENT.NE.0) GO TO 11 PLETR139
IENT=1 PLETR140
DO 10 I=1,358 PLETR141
RX(I)=IRX(I)/20. PLETR142
RY(I)=IRY(I)/20. PLETR143
10 CONTINUE PLETR144
11 I=NX(JLETR) PLETR145
N=NX(JLETR+I)-I PLETR146
IF(THETA.EQ.THLAST) GO TO 12 PLETR147
THLAST=THETA PLETR148
CTH=COS(THETA) PLETR149
STH=SIN(THETA) PLETR150
12 CONTINUE PLETR151
DO 20 J=I,N PLETR152
XX=(RX(J)*CTH-RY(J)*STH)*SIZE PLETR153
YY=(RY(J)*CTH+RX(J)*STH)*SIZE PLETR154
IF(JPLANE-2) 13,14,15 PLETR155
13 XX=XLLHC+XX PLETR156
YY=YLLHC+YY PLETR157
ZZ=ZLLHC PLETR158
GO TO 16 PLETR159
14 XX=XLLHC+XX PLETR160
ZZ=ZLLHC+YY PLETR161
YY=YLLHC PLETR162
GO TO 16 PLETR163
15 ZZ=ZLLHC+YY PLETR164
YY=YLLHC+XX PLETR165
XX=XLLHC PLETR166
16 CALL PROPLT(XX,YY,ZZ,IPEN(J)+10) PLETR167
20 CONTINUE PLETR168
XX=0.8*CTH*SIZE PLETR169
YY=0.8*STH*SIZE PLETR170
IF(JPLANE-2) 21,22,23 PLETR171
21 XNLLHC=XLLHC+XX PLETR172
YNLLHC=YLLHC+YY PLETR173
ZNLLHC=ZLLHC PLETR174
GO TO 24 PLETR175
22 XNLLHC=XLLHC+XX PLETR176
ZNLLHC=ZLLHC+YY PLETR177
YNLLHC=YLLHC PLETR178
GO TO 24 PLETR179
23 ZNLLHC=ZLLHC+YY PLETR180
YNLLHC=YLLHC+XX PLETR181
XNLLHC=XLLHC PLETR182
24 CALL PROPLT(XNLLHC,YNLLHC,ZNLLHC,13) PLETR183
```

RETURN
END

PLETR184
PLETR185

SUBROUTINE PPGREK(/XLLHC/,/YLLHC/,/ZLLHC/,JGREK,THETA,SIZE)

PGREK001

PPGREK GENERATES A PERSPECTIVE PLOT OF A CAPITAL OR LOWER CASE GREEK LETTER.

PGREK002
PGREK003
PGREK004

INPUT PARAMETERS

PGREK005
PGREK006

XLLHC,YLLHC - COORDINATES (IN INCHES) OF THE LOWER LEFT-HAND CORNER OF THE GREEK LETTER

PGREK007
PGREK008

JGREK - CODE NUMBER INDICATING THE GREEK LETTER TO BE PLOTTED

PGREK009
PGREK010

LETTER	CODE FOR CAPITALS	CODE FOR LOWER CASE
ALPHA	1	25
BETA	2	26
GAMMA	3	27
DELTA	4	28
EPSILON	5	29
ZETA	6	30
ETA	7	31
THETA	8	32
(SCRIPT)		33
TOTA	9	34
KAPPA	10	35
LAMBDA	11	36
MU	12	37
NU	13	38
XI	14	39
OMICRON	15	40
PI	16	41
RHO	17	42
SIGMA	18	43
(SCRIPT)		44
TAU	19	45
UPSILON	20	46
PHI	21	47
CHI	22	48
PSI	23	49
OMEGA	24	50

PGREK011
PGREK012

ALPHA

PGREK013

BETA

PGREK014

GAMMA

PGREK015

DELTA

PGREK016

EPSILON

PGREK017

ZETA

PGREK018

ETA

PGREK019

THETA

PGREK020

(SCRIPT)

PGREK021

TOTA

PGREK022

KAPPA

PGREK023

LAMBDA

PGREK024

MU

PGREK025

NU

PGREK026

XI

PGREK027

OMICRON

PGREK028

PI

PGREK029

RHO

PGREK030

SIGMA

PGREK031

(SCRIPT)

PGREK032

TAU

PGREK033

UPSILON

PGREK034

PHI

PGREK035

CHI

PGREK036

PSI

PGREK037

OMEGA

PGREK038

THETA - THE ANGLE (IN RADIANS, IN THE X,Y-PLANE) AT WHICH THE GREEK LETTER IS TO BE WRITTEN

PGREK039
PGREK040

SIZE - THE HEIGHT (IN INCHES) OF THE LETTER

PGREK041
PGREK042

NO OTHER ENTRY POINTS

PGREK043
PGREK044

COMMON BLOCKS

PGREK045
PGREK046

/NEXT/XNLLHC,YNLLHC,ZNLLHC

PGREK047

XNLLHC - X-COORDINATE (IN INCHES) IN X,Y-PLANE OF LOWER LEFT HAND CORNER OF NEXT SYMBOL

PGREK048

YNLLHC - CORRESPONDING Y-COORDINATE

PGREK049

ZNLLHC - CORRESPONDING Z-COORDINATE

PGREK050

/PLANE/JPLANE

PGREK051

JPLANE - INDICATES COORDINATE PLANE PARALLEL TO WHICH GREEK LETTER IS TO BE WRITTEN.

PGREK052

= 1 X,Y-PLANE

PGREK053

= 2 X,Z-PLANE

PGREK054

= 3 Y,Z-PLANE

PGREK055

/LAST/THLAST,CTH,STH

PGREK056

THLAST - LAST VALUE OF THETA

PGREK057

CTH,STH - COSINE AND SINE OF THLAST

PGREK058

PGREK059

SUBROUTINE PPGREK(/XLLHC/,/YLLHC/,/ZLLHC/,JGREK,THETA,SIZE)

PGREK060
PGREK061

```

COMMON/PLANE/JPLANE
COMMON/NEXT/XNLLHC,YNLLHC,ZNLLHC
COMMON/LAST/THLAST,CTH,STH
DIMENSION NX(51),RX(436),RY(436),IPEN(436),IRX(436),IRY(436),
+ LXAE(52),LYAE(52),LIPAE(52),LXZK(54),LYZK(54),LIPZK(54),
+ LXL0(47),LYL0(47),LIPL0(47),LXPIU(56),LYPIU(56),LIPPIU(56),
+ LXFOM(39),LYFOM(39),LIPFOM(39),UXAE(30),UYAE(30),UIPAE(30),
+ UXZK(36),UYZK(36),UIPZK(36),UXL0(37),UYL0(37),UIPLO(37),
+ UXPIU(39),UYPIU(39),UIPPIU(39),UXFOM(46),UYFOM(46),UIPFOM(46)
INTEGER UXAE,UYAE,UIPAE,UXZK,UYZK,UIPZK,UXL0,UYL0,UIPLO,UXPIU,
+ UYPIU,UIPPIU,UXFOM,UYFOM,UIPFOM
EQUIVALENCE (IRX(1),UXAE(1)), (IRY(1),UYAE(1)),
+ (IPEN(1),UIPAE(1)),(IRX(31),UXZK(1)),(IRY(31),UYZK(1)),
+ (IPEN(31),UIPZK(1)),(IRX(67),UXL0(1)),(IRY(67),UYL0(1)),
+ (IPEN(67),UIPLO(1)),(IRX(104),UXPIU(1)),(IRY(104),UYPIU(1)),
+ (IPEN(104),UIPPIU(1)),(IRX(143),UXFOM(1)),(IRY(143),UYFOM(1)),
+ (IPEN(143),UIPFOM(1)),(IRX(189),LXAE(1)),(IRY(189),LYAE(1)),
+ (IPEN(189),LIPAE(1)),(IRX(241),LXZK(1)),(IRY(241),LYZK(1)),
+ (IPEN(241),LIPZK(1)),(IRX(295),LXL0(1)),(IRY(295),LYL0(1)),
+ (IPEN(295),LIPL0(1)),(IRX(342),LXPIU(1)),(IRY(342),LYPIU(1)),
+ (IPEN(342),LIPPIU(1)),(IRX(398),LXFOM(1)),(IRY(398),LYFOM(1)),
+ (IPEN(398),LIPFOM(1))
DATA NX/1,8,19,22,25,31,37,42,57,62,67,69,73,76,93,104,113,119,
+ 126,132,143,158,161,175,189,199,213,221,233,241,252,260,271,
+ 284,289,295,301,309,317,333,342,350,360,369,379,389,398,409,
+ 415,424,437/
DATA UXAE/0,3,9,12,12,0,12,0,8,10,10,8,0,9,12,12,9,0,0,12,12,6,
+ 12,0,10,0,0,12,0,8/
DATA UYAE/17,20,20,17,0,8,8,20,20,18,14,12,12,12,9,3,0,0,20,20,
+ 14,20,0,0,20,20,0,0,12,12/
DATA UIPAE/5*2,3,6*2,3,11*2,3,3*2,3,2/
DATA UXZK/12,0,12,0,2,10,0,0,12,12,12,0,4,8,12,12,8,4,0,0,2,2,2,
+ 10,10,10,12,6,6,0,12,0,0,12,6,12/
DATA UYZK/0,0,20,20,10,10,20,12,12,20,0,4,0,0,4,16,20,20,16,4,
+ 12,8,10,10,12,8,0,0,20,20,20,20,4,20,12,0/
DATA UIPZK/3,3*2,3,2,2,3,2,3,2,3,8*2,3,2,3,2,3,2,2,3,2,3,2,2,3,
+ 2,3,2/
DATA UXL0/6,12,0,6,12,12,0,12,12,4,2,10,8,12,2,6,4,8,6,10,0,4,2,
+ 10,8,12,0,3,9,12,12,9,3,0,0,8,12/
DATA UYL0/20,0,20,8,20,0,20,0,20,4,2,2,0,4,8,12,10,10,8,12,16,
+ 20,18,18,16,20,3,0,0,3,17,20,20,17,3,16,20/
DATA UIPLO/2,2,7*2,2,3,2,3,2,3,2,3,2,3,2,3,2,3,2,3,8*2,3,2/
DATA UXPIU/4,2,2,0,12,10,10,8,12,0,9,12,12,9,0,12,10,0,6,0,10,12,
+ 6,6,0,0,12,12,0,0,2,4,6,8,10,12,12,6,6/
DATA UIPPIU/2,3,2,3,2,3,2,3,2,6*2,3,6*2,3,2,3,3*2,3,8*2,3,2/
DATA UYPIU/0,0,20,20,20,20,0,0,0,20,20,17,11,8,8,18,20,20,10,0,0,
+ 2,0,20,17,20,20,17,16,18,20,20,18,20,20,18,16,18,0/
DATA UXFOM/0,2,10,12,12,10,2,0,0,4,8,6,6,4,8,12,0,12,0,2,2,4,8,
+ 10,10,12,4,8,6,6,4,8,0,0,2,2,0,0,4,8,12,12,10,10,12,12/
DATA UYFOM/8,6,6,8,12,14,14,12,8,0,0,0,20,20,20,20,20,0,14,14,10,
+ 8,8,10,14,14,20,20,20,0,0,0,2,0,0,4,12,16,20,20,16,12,4,0,0,2/
DATA UIPFOM/3,8*2,3,2,3,2,3,2,2,3,2,3,7*2,3,2,3,2,3,2,3,13*2/
DATA LXAE/12,10,8,4,0,0,4,8,10,12,2,4,8,10,12,12,10,6,10,11,11,
+ 8,6,2,0,0,2,6,8,8,6,12,4,0,0,4,8,12,12,0,0,4,8,12,12,4,0,0,4,
+ 12,0,8/
DATA LYAE/12,2,0,0,4,8,12,12,10,0,10,16,20,20,18,14,10,12,10,8,4,
+ 2,2,6,8,10,12,12,10,6,0,12,12,8,4,0,0,4,8,14,15,20,20,16,0,0,
+ 4,8,12,12,6,6/
DATA LIPAE/3,16*2,3,6*2,3,7*2,3,11*2,3,5*2,3,2/
DATA LXZK/4,12,12,4,0,0,4,10,12,10,4,2,4,0,4,8,12,10,12,0,4,6,10,
+ 12,8,6,2,0,1,11,0,2,2,4,8,10,10,8,6,2,2,6,12,6,2,2,4,10,0,12,

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PGREK062
PGREK063
PGREK064
PGREK065
PGREK066
PGREK067
PGREK068
PGREK069
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PGREK115
PGREK116
PGREK117
PGREK118
PGREK119
PGREK120
PGREK121
PGREK122

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+ 6,0,8,12/ PGREK123
DATA LYZK/20,16,18,18,14,8,4,4,2,0,0,0,12,12,8,12,8,-4,-6,4,0,0,4, PGREK124
+ 16,20,20,16,4,10,10,6,6,2,0,0,2,18,20,20,16,12,8,8,12,4,2,0,0, PGREK125
+ 12,12,10,6,0,0/ PGREK126
DATA LIPZK/3,13*2,3,4*2,3,8*2,3,2,3,12*2,3,5*2,3,4*2/ PGREK127
DATA LXL0/6,0,2,6,10,12,0,4,2,4,10,12,11,12,0,4,4,2,0,2,6,12,0,2, PGREK128
+ 12,2,0,0,2,12,2,0,0,2,10,12,10,4,0,2,6,12,12,10,6,0,0/ PGREK129
DATA LYLO/12,20,20,12,0,0,-8,12,2,0,0,12,2,0,12,12,10,4,0,0,2,12, PGREK130
+ 20,18,18,18,16,13,11,11,11,9,6,4,4,2,0,0,2,0,0,6,10,12,12,6,2/ PGREK131
DATA LIPL0/2,3,4*2,3,7*2,3,7*2,3,2,2,3,4*2,3,7*2,3,8*2/ PGREK132
DATA LXPIU/0,4,12,4,2,8,9,12,0,2,2,6,8,12,12,8,6,2,6,10,10,6,4,0, PGREK133
+ 0,4,12,2,4,8,10,10,0,0,2,10,12,0,4,10,12,4,2,2,4,8,10,0,4,2,2, PGREK134
+ 4,8,10,12,10/ PGREK135
DATA LYPIU/10,12,12,12,0,12,0,0,-8,-4,8,12,12,8,4,0,0,4,12,8,4,0, PGREK136
+ 0,4,8,12,12,2,0,0,2,4,8,10,12,12,10,10,12,10,12,12,4,2,0,0,2, PGREK137
+ 12,12,4,2,0,0,2,10,12/ PGREK138
DATA LIPPIU/3,2,2,3,2,3,2,2,3,9*2,3,8*2,3,9*2,3,3*2,3,5*2,3,8*2/ PGREK139
DATA LXF0M/0,2,10,12,12,10,2,0,0,2,10,0,2,10,12,2,10,0,2,2,4,8, PGREK140
+ 12,12,10,4,2,0,0,2,4,6,6,6,8,10,12,12,10/ PGREK141
DATA LYF0M/5,3,3,5,7,9,9,7,5,0,12,12,12,0,0,0,12,10,10,8,4,4,8, PGREK142
+ 10,12,0,12,10,2,0,0,2,8,2,0,0,2,10,12/ PGREK143
DATA LIPF0M/3,8*2,3,2,3,3*2,3,2,3,6*2,3,2,3,6*2,3,5*2/ PGREK144
DATA IFNT/0/ PGREK145
IF(IFNT.NE.0) GO TO 11 PGREK146
IFNT=1 PGREK147
DO 10 I=1,436 PGREK148
RX(I)=IRX(I)/20. PGREK149
RY(I)=IRY(I)/20. PGREK150
IF(RY(I).LT.-1.0) RY(I)=11.5/20.0 PGREK151
10 CONTINUE PGREK152
11 I=NX(JGREK) PGREK153
N=NX(JGREK+1)-1 PGREK154
IF(THETA.EQ.THLAST) GO TO 12 PGREK155
THLAST=THETA PGREK156
CTH=COS(THETA) PGREK157
STH=SIN(THETA) PGREK158
12 CONTINUE PGREK159
DO 20 J=1,N PGREK160
XX=(RX(J)*CTH-RY(J)*STH)*SIZE PGREK161
YY=(RY(J)*CTH+RX(J)*STH)*SIZE PGREK162
IF(JPLANE=2) 13,14,15 PGREK163
13 XX=XLLHC+XX PGREK164
YY=YLLHC+YY PGREK165
ZZ=ZLLHC PGREK166
GO TO 16 PGREK167
14 XX=XLLHC+XX PGREK168
ZZ=ZLLHC+YY PGREK169
YY=YLLHC PGREK170
GO TO 16 PGREK171
15 ZZ=ZLLHC+YY PGREK172
YY=YLLHC+XX PGREK173
XX=XLLHC PGREK174
16 CALL PROPLT(XX,YY,ZZ,IPFN(J)+10) PGREK175
20 CONTINUE PGREK176
XX=0.8*CTH*SIZE PGREK177
YY=0.8*STH*SIZE PGREK178
IF(JPLANE=2) 21,22,23 PGREK179
21 XNLLHC=XLLHC+XX PGREK180
YNLLHC=YLLHC+YY PGREK181
ZNLLHC=ZLLHC PGREK182
GO TO 24 PGREK183

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22 XNLLHC=XLLHC+XX
ZNLLHC=ZLLHC+YY
YNLLHC=YLLHC
GO TO 24

23 ZNLLHC=ZLLHC+YY
YNLLHC=YLLHC+XX
XNLLHC=XLLHC

24 CALL PROPLT(XNLLHC,YNLLHC,ZNLLHC,13)
RETURN
END

PGRFK184
PGRFK185
PGRFK186
PGRFK187
PGRFK188
PGRFK189
PGRFK190
PGRFK191
PGRFK192
PGRFK193

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C SUBROUTINE PPDIGT(/XLLHC/,/YLLHC/,/ZLLHC/,JDIGT,THETA,SIZE) PDIGT001
C PDIGT002
C PPNUMB GENERATES A PERSPECTIVE PLOT OF A DIGIT. PDIGT003
C PDIGT004
C INPUT PARAMETERS PDIGT005
C XLLHC,YLLHC - THE X,Y-COORDINATES (IN INCHES) OF THE PDIGT006
C LOWER LEFT-HAND CORNER OF THE DIGIT. PDIGT007
C JDIGT - THE DIGIT TO BE PLOTTED PDIGT008
C THETA - THE ANGLE (IN RADIANS, IN THE X,Y-PLANE) AT PDIGT009
C WHICH THE DIGIT IS TO BE PLOTTED. PDIGT010
C SIZE - THE HEIGHT (IN INCHES) OF THE DIGIT. PDIGT011
C PDIGT012
C NO OTHER ENTRY POINTS PDIGT013
C PDIGT014
C COMMON BLOCKS PDIGT015
C /NEXT/XNLLHC,YNLLHC,ZNLLHC PDIGT016
C XNLLHC - X-COORDINATE (IN INCHES) IN X,Y-PLANE OF PDIGT017
C LOWER LEFT HAND CORNER OF NEXT SYMBOL PDIGT018
C YNLLHC - CORRESPONDING Y-COORDINATE PDIGT019
C ZNLLHC - CORRESPONDING Z-COORDINATE PDIGT020
C /PLANE/JPLANE PDIGT021
C JPLANE - INDICATES COORDINATE PLANE PARALELL TO PDIGT022
C WHICH DIGIT IS TO BE WRITTEN. PDIGT023
C = 1 X,Y-PLANE PDIGT024
C = 2 X,Z-PLANE PDIGT025
C = 3 Y,Z-PLANE PDIGT026
C /LAST/THLAST,CTH,STH PDIGT027
C THLAST - LAST VALUE OF THETA PDIGT028
C CTH,STH - COSINE AND SINE OF 'THLAST' PDIGT029
C PDIGT030
C SUBROUTINE PPDIGT(/XLLHC/,/YLLHC/,/ZLLHC/,JDIGT,THETA,SIZE) PDIGT031
C COMMON/PLANE/JPLANE PDIGT032
C COMMON/NEXT/XNLLHC,YNLLHC,ZNLLHC PDIGT033
C COMMON/LAST/THLAST,CTH,STH PDIGT034
C DIMENSION NX(11),RX(88),RY(88),IPEN(88),IRX(88),IRY(88) PDIGT035
C DATA NX/1,10,14,22,31,36,46,58,60,77,89/ PDIGT036
C DATA IRX/0,0,4,8,12,12,8,4,0,12,4,6,6,0,4,8,12,12,0,0,12,0,12,4,8, PDIGT037
C + 12,12,8,4,0,8,0,12,10,10,0,4,8,12,12,8,4,0,0,12,12,8,4,0,0,4, PDIGT038
C + 8,12,12,8,4,0,12,0,0,3,9,12,12,9,3,0,0,4,2,2,4,8,10,10,8,12,8, PDIGT039
C + 4,0,0,4,8,12,12,8,4,0/ PDIGT040
C DATA IRY/4,16,20,20,16,4,0,0,4,0,12,20,0,16,20,20,16,12,2,0,0,20, PDIGT041
C + 20,14,14,10,4,0,0,4,20,6,6,14,0,4,0,0,4,10,14,14,10,20,20,16, PDIGT042
C + 20,20,16,4,0,0,4,10,14,14,10,20,20,3,0,0,3,9,12,12,9,3,12,14, PDIGT043
C + 18,20,20,18,14,12,10,6,6,10,16,20,20,16,4,0,0,4/ PDIGT044
C DATA IPEN/3,9*2,3,2,2,3,7*2,3,8*2,3,2,2,3,2,3,9*2,3,13*2,3,8*2,3, PDIGT045
C + 7*2,3,11*2/ PDIGT046
C DATA IENT/0/ PDIGT047
C IF(IENT.NE.0) GO TO 11 PDIGT048
C IENT=1 PDIGT049
C DO 10 I=1,88 PDIGT050
C RX(I)=IRX(I)/20. PDIGT051
C RY(I)=IRY(I)/20. PDIGT052
10 CONTINUE PDIGT053
11 KDIGT=JDIGT+1 PDIGT054
C I=NX(KDIGT) PDIGT055
C N=NX(KDIGT+1)-1 PDIGT056
C IF(THETA.EQ.THLAST) GO TO 12 PDIGT057
C THLAST=THETA PDIGT058
C CTH=COS(THETA) PDIGT059
C STH=SIN(THETA) PDIGT060
12 CONTINUE PDIGT061

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DD 20 J=I,M	PDIGT062
XX=(RX(J)*CTH-RY(J)*STH)*SIZE	PDIGT063
YY=(RY(J)*CTH+RX(J)*STH)*SIZE	PDIGT064
IF(JPLANE-2) 13,14,15	PDIGT065
13 XX=XLLHC+XX	PDIGT066
YY=YLLHC+YY	PDIGT067
ZZ=ZLLHC	PDIGT068
GO TO 16	PDIGT069
14 XX=XLLHC+XX	PDIGT070
ZZ=ZLLHC+YY	PDIGT071
YY=YLLHC	PDIGT072
GO TO 16	PDIGT073
15 ZZ=ZLLHC+YY	PDIGT074
YY=YLLHC+XX	PDIGT075
XX=XLLHC	PDIGT076
16 CALL PROPLT(XX,YY,ZZ,IPEN(J)+10)	PDIGT077
20 CONTINUE	PDIGT078
XX=0.8*CTH*SIZE	PDIGT079
YY=0.8*STH*SIZE	PDIGT080
IF(JPLANE-2) 21,22,23	PDIGT081
21 XNLLHC=XLLHC+XX	PDIGT082
YNLLHC=YLLHC+YY	PDIGT083
ZNLLHC=ZLLHC	PDIGT084
GO TO 24	PDIGT085
22 XNLLHC=XLLHC+XX	PDIGT086
ZNLLHC=ZLLHC+YY	PDIGT087
YNLLHC=YLLHC	PDIGT088
GO TO 24	PDIGT089
23 ZNLLHC=ZLLHC+YY	PDIGT090
YNLLHC=YLLHC+XX	PDIGT091
XNLLHC=XLLHC	PDIGT092
24 CALL PROPLT(XNLLHC,YNLLHC,ZNLLHC,13)	PDIGT093
RETURN	PDIGT094
END	PDIGT095

SUBROUTINE PPCHAR(/XLLHC/, /YLLHC/, /ZLLHC/, JCHAR, THETA, SIZE)

PPCHAR GENERATES A PERSPECTIVE PLOT OF A SPECIAL CHARACTER.

INPUT PARAMETERS

XLLHC, YLLHC - THE COORDINATES (IN INCHES) OF THE LOWER LEFT-HAND CORNER OF THE CHARACTER

JCHAR - CODE NUMBER INDICATING THE CHARACTER TO BE PLOTTED

CHARACTER	CODE NO.
(BLANK)	1
&	2
-	3
/	4
°	5
?	6
"	7
?	8
EXCLAMATION MARK	9
:	10
\$	11
#	12
ARROW POINTING LEFT TO RIGHT	13
*	14
%	15
@	16
(17
)	18
FLAG	19
°	20
+	21
:	22
-	23
=	24
NOT DEFINED AS	25
CENT SIGN	26
+ AND -	27
CHECK	28
>	29
<	30
NOT =	31
'CURLY D'	32
DEL	33
DIVISION	34
INTEGRAL SIGN	35
LEFT BRACKET	36
RIGHT BRACKET	37
LEFT BRACE	38
RIGHT BRACE	39
>=	40
<=	41
INFINITY	42
SIMILAR TO	43
(LOGICAL NEGATION)	
DEFINED AS	44
APPROX. =	45
CONGRUENT TO	46
SQUARE ROOT	47
DEGREE	48
ANGSTROM	49

PCHAR001
PCHAR002
PCHAR003
PCHAR004
PCHAR005
PCHAR006
PCHAR007
PCHAR008
PCHAR009
PCHAR010
PCHAR011
PCHAR012
PCHAR013
PCHAR014
PCHAR015
PCHAR016
PCHAR017
PCHAR018
PCHAR019
PCHAR020
PCHAR021
PCHAR022
PCHAR023
PCHAR024
PCHAR025
PCHAR026
PCHAR027
PCHAR028
PCHAR029
PCHAR030
PCHAR031
PCHAR032
PCHAR033
PCHAR034
PCHAR035
PCHAR036
PCHAR037
PCHAR038
PCHAR039
PCHAR040
PCHAR041
PCHAR042
PCHAR043
PCHAR044
PCHAR045
PCHAR046
PCHAR047
PCHAR048
PCHAR049
PCHAR050
PCHAR051
PCHAR052
PCHAR053
PCHAR054
PCHAR055
PCHAR056
PCHAR057
PCHAR058
PCHAR059
PCHAR060


```

+ 6,6,4,2,0,6,12,3,9,5,7,9,9,7,5,3,3,5,1,3,5,3,1,7,9,11,9,7,-12, PCHAR121
+ -6,0,-6,-16,-2,-16,-2/ PCHAR122
DATA IRY/0,6,0,0,4,8,14,18,20,20,18,16,6,0,6,6,20,0,2,4,2,0,2,0, PCHAR123
+ 2,4,0,-4,20,14,20,20,14,20,18,20,20,18,13,11,11,9,6,4,2,0,2,4, PCHAR124
+ 6,20,20,6,4,2,0,2,4,0,2,4,2,0,12,10,8,10,12,4,2,2,4,8,10,10,12, PCHAR125
+ 16,18,18,16,20,0,20,0,12,20,20,12,18,18,14,14,12,6,0,6,6,0,12, PCHAR126
+ 12,0,6,6,20,18,16,14,14,16,18,20,20,0,0,2,4,6,6,4,2,0,5,3,3,5, PCHAR127
+ 7,9,9,7,9,3,3,9,12,12,9,3,0,0, 3,20,20,16,4,0,0,0,4,16,20,20, PCHAR128
+ 16,18,20,20,18,16,18,20,20,18,16,14,20,20,14,0,12,6,6,12,10,8, PCHAR129
+ 10,12,2,0,2,4,0,-4,-2,-2,4,4,8,8,12,10,10,6,6,2,2,12,8,10,10,8, PCHAR130
+ 2,0,0,2,0,0,12,6,6,5,0,20,6,12,0,6,12,12,8,8,4,4,16,20,20,16,8, PCHAR131
+ 4,0,0,4,6,10,10,6,4,0,20,20,0,2,2,4,4,2,10,10,8,8,10,6,6,0,2, PCHAR132
+ 2,0,0,2,18,20,20,18,18,20,0,0,20,20,0,20,20,0,0,2,8,10,12,18, PCHAR133
+ 20,20,0,2,8,10,12,18,20,20,0,4,4,6,12,18,0,4,4,6,12,18,6,4,4, PCHAR134
+ 6,8,10,10,8,6,4,4,6,8,10,10,8,8,10,6,8,2,2,6,6,10,10,6,8,4,6, PCHAR135
+ 10,8,12,10,2,2,6,6,10,12,8,10,8,0,20,16,18,20,20,18,16,14,14, PCHAR136
+ 16,16,0,8,8,17,17,19,21,23,23,21,19,17,16,14,16,18,16,16,14, PCHAR137
+ 16,18,16,0,6,0,-6,-4,-4,24,24/ PCHAR138
DATA IENT/0/ PCHAR139
IF(IENT.NE.0) GO TO 11 PCHAR140
IENT=1 PCHAR141
DO 10 I=1,383 PCHAR142
RX(I)=IRX(I)/20.0 PCHAR143
RY(I)=IRY(I)/20.0 PCHAR144
10 CONTINUE PCHAR145
11 I=NX(JCHAR) PCHAR146
N=NX(JCHAR+1)-1 PCHAR147
IF(THETA.EQ.THLAST) GO TO 12 PCHAR148
CTH=COS(THETA) PCHAR149
STH=SIN(THETA) PCHAR150
THLAST=THETA PCHAR151
12 CONTINUE PCHAR152
DO 20 J=I,N PCHAR153
XX=(RX(J)*CTH-RY(J)*STH)*SIZE PCHAR154
YY=(RY(J)*CTH+RX(J)*STH)*SIZE PCHAR155
IF(JPLANE-2) 13,14,15 PCHAR156
13 XX=XLLHC+XX PCHAR157
YY=YLLHC+YY PCHAR158
ZZ=ZLLHC PCHAR159
GO TO 16 PCHAR160
14 XX=XLLHC+XX PCHAR161
ZZ=ZLLHC+YY PCHAR162
YY=YLLHC PCHAR163
GO TO 16 PCHAR164
15 YY=YLLHC+XX PCHAR165
ZZ=ZLLHC+YY PCHAR166
XX=XLLHC PCHAR167
16 CALL PROPLT(XX,YY,ZZ,IPEN(J)+10) PCHAR168
20 CONTINUE PCHAR169
IF(JCHAR.EQ.52) GO TO 25 PCHAR170
IF(JCHAR.EQ.53) GO TO 25 PCHAR171
XX=0.8*CTH*SIZE PCHAR172
YY=0.8*STH*SIZE PCHAR173
IF(JPLANE-2) 21,22,23 PCHAR174
21 XNLLHC=XX+XLLHC PCHAR175
YNLLHC=YY+YLLHC PCHAR176
ZNLLHC=ZLLHC PCHAR177
GO TO 24 PCHAR178
22 XNLLHC=XX+XLLHC PCHAR179
ZNLLHC=YY+ZLLHC PCHAR180

```

```
YNLLHC=YLLHC  
GO TO 24  
23 ZNLLHC=YY+ZLLHC  
YNLLHC=XX+YLLHC  
XNLLHC=XLLHC  
24 CALL PROPLT (XNLLHC,YNLLHC,ZNLLHC,13)  
RETURN  
25 XNLLHC=XLLHC  
YNLLHC=YLLHC  
ZNLLHC=ZLLHC  
GO TO 24  
END
```

```
PCHAR181  
PCHAR182  
PCHAR183  
PCHAR184  
PCHAR185  
PCHAR186  
PCHAR187  
PCHAR188  
PCHAR189  
PCHAR190  
PCHAR191  
PCHAR192
```

```

C SUBROUTINE PPSYMB(XDATA,YDATA,ZDATA,JSYMB,SIZE) PSYMB001
C PSYMB002
C PPSYMB GENERATES A PERSPECTIVE PLOT OF A PLOTTING SYMBOL (AS PSYMB003
C IN 'XYPLOT') PSYMB004
C PSYMB005
C INPUT PARAMETERS PSYMB006
C XDATA,YDATA,ZDATA - COORDINATES (IN INCHES) OF THE PSYMB007
C DATA POINT. PSYMB008
C JSYMB - CODE NUMBER INDICATING THE SYMBOL TO BE PSYMB009
C PLOTTED (CF. 'XYPLOT') PSYMB010
C SIZE - THE SIZE (IN INCHES) OF THE SYMBOL PSYMB011
C PSYMB012
C NO OTHER ENTRY POINTS PSYMB013
C PSYMB014
C COMMON BLOCKS PSYMB015
C /PLANE/JPLANE PSYMB016
C JPLANE - INDICATES COORDINATE PLANE TO WRITE PSYMB017
C PARALLEL TO. PSYMB018
C = 1 X,Y-PLANE PSYMB019
C = 2 X,Z-PLANE PSYMB020
C = 3 Y,Z-PLANE PSYMB021
C PSYMB022
C SUBROUTINE PPSYMB(XDATA,YDATA,ZDATA,JSYMB,SIZE) PSYMB023
C COMMON /PLANE/JPLANE PSYMB024
C DIMENSION NX(16),RX(84),RY(84),IPEN(84),IRX(84),IRY(84) PSYMB025
C DATA NX/1,7,17,21,26,31,36,41,45,49,53,64,72,77,79,85/ PSYMB026
C DATA IRX/0,2,2,-2,-2,0,0,1,2,2,1,-1,-2,-2,-1,0,0,2,-2,0,0,-2,2,0, PSYMB027
+ 0,2,-2,2,-2,0,0,2,0,-2,0,0,0,-2,2,0,-2,2,-2,2,-2,2,-2,2,-2, PSYMB028
+ 0,0,2,-2,-1,-1,-2,-1,1,2,1,1,-1,-2,2,0,0,2,-2,-2,2,2,-2,2,-2, PSYMB029
+ 0,0,0,1,1,-2,2,-2,1/ PSYMB030
C DATA IRY/2,2,-2,-2,2,2,2,2,1,-1,-2,-2,-1,1,2,2,2,-1,-1,2,2,0,0, PSYMB031
+ -2,0,2,2,-2,-2,0,2,0,-2,0,2,-2,2,0,0,2,-2,2,2,-2,2,2,-2,-2,2, PSYMB032
+ 2,0,-2,2,2,1,-1,-2,-1,-1,-2,-1,1,1,-2,2,2,-2,-2,2,0,0,2,2,-2, PSYMB033
+ -2,0,2,-2,2,-2,1,1,-2,2/ PSYMB034
C DATA IPEN/21*2,3,2,3,2,2,3,2,3,6*2,3,4*2,3,3*2,3,4*2,3,3*2,3,3*2, PSYMB035
+ 3,2,2,3,2,2,3,2,3,2,3,2,3,6*2,3,2,3,5*2/ PSYMB036
C DATA IFNT/0/ PSYMB037
C IF(IFNT.NE.0) GO TO 11 PSYMB038
C IFNT=1 PSYMB039
C DO 10 I=1,84 PSYMB040
C RX(I)=IRX(I)/4. PSYMB041
C RY(I)=IRY(I)/4. PSYMB042
10 CONTINUE PSYMB043
11 I=NX(JSYMB) PSYMB044
C N=NX(JSYMB+1)-1 PSYMB045
C CALL PROPLT(XDATA,YDATA,ZDATA,13) PSYMB046
C DO 20 J=I,N PSYMB047
C XX=RX(J)*SIZE PSYMB048
C YY=RY(J)*SIZE PSYMB049
C IF(JPLANE=2) 13,14,15 PSYMB050
13 XX=XX+XDATA PSYMB051
C YY=YY+YDATA PSYMB052
C ZZ=ZDATA PSYMB053
C GO TO 16 PSYMB054
16 XX=XX+ZDATA PSYMB055
C ZZ=YY+ZDATA PSYMB056
C YY=YDATA PSYMB057
C GO TO 16 PSYMB058
15 ZZ=YY+ZDATA PSYMB059
C YY=XX+YDATA PSYMB060
C XX=XDATA PSYMB061

```

```
16 CALL PROPLT(XX,YY,ZZ,IPEN(J)+10)
20 CONTINUE
   CALL PROPLT(XDATA,YDATA,ZDATA,13)
   RETURN
   END
```

PSYMB062
PSYMB063
PSYMB064
PSYMB065
PSYMB066